

B1 5. A substantially pure DNA wherein the sense strand of said DNA encodes the primary amino acid sequence of a beta2 subunit of a neuronal nicotinic acetylcholine receptor.

6. The substantially pure DNA of claim 5 wherein said DNA is the protein coding region of pPCX49, ATCC No. 67643.

7. Substantially pure DNA having the protein coding region of the nucleotide sequence shown in Figures 7B(1), 7B(2), and 7B(3).

8. Substantially pure DNA having a nucleotide sequence that encodes a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein said beta2 subunit is functionally equivalent to the beta2 subunit encoded by the protein coding region of pPCX49, ATCC No. 67643.

9. Substantially pure DNA having a nucleotide sequence that encodes a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein said beta2 subunit is functionally equivalent to the beta2 subunit encoded by the nucleotide sequence shown in Figures 7B(1), 7B(2), and 7B(3).

11. Substantially pure DNA encoding a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein the amino acid sequence of said beta2 subunit has greater than 68% sequence identity with the beta2 subunit shown in Figures 7B(1), 7B(2), and 7B(3).

B2 12. A substantially pure mRNA having a nucleotide sequence transcribed from DNA, wherein the sense strand of said DNA encodes the primary amino acid sequence of a beta2 subunit of a neuronal nicotinic acetylcholine receptor.

B3 14. Cells transformed by the substantially pure DNA of Claim 5.

B3 15. Isolated nucleic acid that hybridizes under stringent conditions to nucleic acid having a nucleotide sequence encoding the polypeptide sequence set forth in Figures 7B(1), 7B(2), and 7B(3).

16. A substantially pure RNA having a nucleotide sequence that is complementary to the nucleotide sequence of the DNA of claim 5.

Please add the following new claims:

B4 18. A substantially pure DNA wherein the sense strand encodes the amino acid sequence of a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein said beta2 subunit has the ability to substitute for the muscle beta1 subunit in the formation of an acetylcholine receptor, and wherein said beta2 subunit is not able to substitute for the gamma or delta subunit of a neuronal nicotinic acetylcholine receptor.

19. The substantially pure DNA of claim 18, wherein a neuronal nicotinic acetylcholine receptor comprising said beta2 subunit and an alpha2 subunit is not blocked by either bungarotoxin 3.1 or α -bungarotoxin.

20. The substantially pure DNA of claim 18, wherein said beta2 subunit forms, with an alpha3 or an alpha4 subunit, a neuronal nicotinic acetylcholine receptor that is blocked by bungarotoxin 3.1 but not by α -bungarotoxin.

21. The substantially pure DNA of claim 18, wherein said beta2 subunit has amino acid residues corresponding to Cys-128 and Cys-142 of the Torpedo electric organ alpha subunit, but lacking the corresponding Cys-192 and Cys-193 residues.

22. The substantially pure DNA of claim 18, wherein said beta2 subunit has approximately 50% sequence identity to neuronal nicotinic acetylcholine receptor alpha subunits.

B4 23. The substantially pure DNA of claim 18, wherein said beta2 subunit is not labeled by 4-(N-maleimido)benzyltrimethyl-ammoniumiodide (MBTA).

24. A substantially pure DNA wherein the sense strand encodes the amino acid sequence of a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein said beta2 subunit has two or more properties selected from the group consisting of:

- (a) being able to substitute for the muscle beta1 subunit in the formation of an acetylcholine receptor;
- (b) not being able to substitute for the gamma or delta subunit of a neuronal nicotinic acetylcholine receptor;
- (c) not being labeled by 4-(N-maleimido)benzyltrimethyl-ammoniumiodide (MBTA);
- (d) having amino acid residues corresponding to Cys-128 and Cys-142 of the Torpedo electric organ alpha subunit, but lacking the corresponding Cys-192 and Cys-193 residues;
- (e) having approximately 50% sequence identity to neuronal nicotinic acetylcholine receptor alpha subunits;
- (f) not binding acetylcholine, nicotine or analogs thereof;
- (g) forming, in conjunction with an alpha3 or an alpha4 subunit, a neuronal nicotinic acetylcholine receptor that is blocked by bungarotoxin 3.1 but not by α -bungarotoxin; and
- (h) forming, in conjunction with an alpha2 subunit, a neuronal nicotinic acetylcholine receptor that is not blocked by either bungarotoxin 3.1 or α -bungarotoxin.

25. Isolated nucleic acid that hybridizes under stringent conditions to the cloned EcoRI fragment insert in pPCX49, ATCC No. 67643.

26. A substantially pure nucleic acid, the sense strand of which encodes the amino acid sequence of a beta2 subunit of a neuronal nicotinic acetylcholine receptor, wherein said nucleic acid hybridizes under stringent conditions to a radiolabeled probe made from a cloned cDNA encoding an alpha3 subunit of a neuronal nicotinic acetylcholine receptor.

B4 27. The substantially pure nucleic acid of claim 26, wherein said cloned cDNA encoding an alpha3 subunit of a neuronal nicotinic acetylcholine receptor is the cloned DNA insert in pPCA48, ATCC No. 67642.

28. A substantially pure and/or synthetic nucleic acid probe for detecting nucleic acids encoding a beta2 subunit of a neuronal nicotinic acetylcholine receptor, said nucleic acid probe comprising a set of contiguous nucleotides, said probe having a sequence of at least about 15 contiguous nucleotides derived from the nucleotide sequence of the DNA of claim 5.

29. A substantially pure and/or synthetic nucleic acid probe for detecting nucleic acids encoding members of the neuronal nicotinic acetylcholine receptor gene family, said probe having a sequence of at least about 15 contiguous nucleotides derived from a sequence that encodes a transmembrane domain selected from the group consisting of TMD I, TMD II, TMD III and TMD IV of the beta2 neuronal nicotinic acetylcholine receptor subunit polypeptide shown in Figure 8.

30. A substantially pure and/or synthetic nucleic acid probe for detecting nucleic acids encoding beta2 subunit of a neuronal nicotinic acetylcholine receptor, said probe having a sequence of at least about 15 contiguous nucleotides from a sequence that encodes the cytoplasmic domain of the beta2 subunit shown in Figure 8.

31. Cells transformed by the substantially pure DNA of Claim 24.

32. A vector containing the nucleic acid of claim 24.

33. Substantially pure DNA having the nucleotide sequence of residues -179 to -1 in Figures 7B(1) or residues 1510-2017 of Figure 7B(3).

Concluded

add C1